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Reconsidering the Relationship between Generic and Situated IL Approaches: The Dreyfus Model of Skill Acquisition in Formal Information Literacy Learning Environments, Part II

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Reconsidering the Relationship between Generic and Situated IL Approaches: The Dreyfus Model of Skill Acquisition in Formal Information Literacy Learning Environments, Part II

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In the first paper in this series (Farrell, 2012), the Dreyfus model of skill acquisition was put forward as a means by which librarians might understand in a new way the relationship between generic and situated approaches to information literacy (IL) theory and instruction in formal higher education learning environments. The five stages of Dreyfus' model – Novice, Advanced Beginner, Competent, Proficient, and Expert – paint a picture of a process by which students transition from dependence on conceptual instructional principles or rules in early skill performance to embodied, perceptual, situated responsiveness as they gain experience. As noted in the first part of this article (Farrell, 2012, p. 9), the Dreyfus model suggests that learners, as they progress towards expertise, gradually "switch from detached rule following to a more involved and situation-specific way of coping" (Dreyfus, 2006, p. 46). In other words, within the continuum of this process, students gradually move from an emotionally detached, analytic attitude as they perform their nascent skills to emotionally involved, intuitive practice. Again, this "switch" involves a qualitative change in the way a practitioner of a skill takes a perspective, makes a decision, and is emotionally involved in a situation (Dreyfus & Dreyfus, 1988, pp. 16-51).

This second paper will consider in detail how Dreyfus' model might be used by academic librarians to scaffold information literacy learning opportunities that foster students' development of information behaviors characteristic of experts within various disciplinary contexts. To do this we will build on several of the models mentioned in the previous article. We will also draw on representative works in the IL field that have put forward instructional activities and pedagogical strategies both for teaching generic IL skills and competencies, as well as those focused on the acculturation of students to the norms and behaviors characteristic of situated disciplinary IL practices.

The work of Kautto and Talja (2007) and Badke (2012), as well as the many works on the situated nature of information literacy cited in the first part of this article, make clear that information literacy learning opportunities must ultimately be located within the context of the disciplines. These authors challenge information literacy specialists practicing in higher education to articulate how and what information literacy learning opportunities best facilitate the socialization of students into the information practices characteristic of the various "tribes" (Kautto & Talja, 2007) to which they aspire to belong. The Dreyfus model of skill acquisition is one possible answer to this challenge. IL specialists in colleges and universities can bring this model to disciplinary faculty, and through its aid, re-position information literacy as central to disciplinary expertise and themselves as curricular or instructional consultants and designers within the formal learning environment of higher education. In other words, the model outlined

in these papers can guide both librarians and disciplinary faculty as they "establish research processes development goals for each course" in a major, discipline, or program as Badke advocates (2012, p. 169).

It will be argued that such goals and the corresponding learning opportunities students need to achieve them should be designed to aid students' transition from what Lloyd (2005) describes as "acting as" members of a community of practice, to "being a part of" that community. Restated from another perspective, we will consider the process by which students learn to become a part of new disciplinary worlds, worlds they will ultimately perceive from positions of emotional involvement, worlds that afford them certain paths of action, and that solicit from them intuitive responses. In this article, the "information landscape" in which the student will come to perform her work – whether a workplace in the academy, outside the academy, or in everyday life situations – is held as a guiding end in view for the design of information literacy learning opportunities within formal learning environments. Learning opportunities distributed through disciplinary curricula, when viewed from the perspective afforded by the stages of skill acquisition put forward by Dreyfus, can be seen as bridges between the landscape of the formal learning environment and the landscape of practice outside the formal learning environment.

The landscape for which those in higher education seek to prepare students is often the academic landscape in which they themselves belong as experts and work as professionals. However, most students in undergraduate and graduate programs do not pursue careers in higher education. In the United States, for example, out of the roughly four and a half million secondary degrees awarded by Title IV institutions in the 2011-2012 academic year, only about 170,000 were conferred at the doctorate level (Ginder & Kelly-Reid, 2013, Table 3). Given this reality, we will here attempt to show how the Drefyus model can be applied within higher education learning environments to facilitate the development of information behaviors needed for embodied IL skill in disciplines or domains of practice outside the academy as well as within it.

We will advocate for an all-of-the-above approach to who can or should provide and guide the learning opportunities of students in formal higher education learning environments. The Dreyfus model makes clear that students need scaffolded, iterative, and recursive experiences to acquire the perceptual background they need to develop an intuitive feel for the information behaviors proper to a domain of practice. As Ericsson, et al.'s (1993) heavily cited research has shown, concentrated, intense, and extensive deliberate practice – many thousands of hours of practice over many years – is typically needed for individuals to develop expert-level skill performance. Given that the majority of students who enter formal higher education stay only to acquire two, four, or Master's level degrees (Ginder & Kelly-Reid, 2013), it is important that both librarians and disciplinary faculty play a role in leading students towards developing expert-level information seeking behaviors in order to provide a sufficient number of the various formal learning opportunities students need to develop towards, if not fully become, expert level researchers. Moreover, the fact that students spend the majority of their time in higher education within the disciplinary classroom or engaged in independent work outside the classroom assigned by disciplinary instructors makes it clear that the central location for creating learning opportunities again must be within the disciplinary curriculum itself.

One article cannot do justice to the multiplicity of approaches that might facilitate the IL development of every student in every profession, vocation, trade, or art – what will here be called "disciplines" or "domains of practice." Within the limited space of this article, the kinds of learning experiences that facilitate IL development in domains of practice in general will be spoken of in broad terms and the principles discussed will be illustrated by domain specific examples. Nor can a full review of how the instructional practices put forward in the extant literature might align with Dreyfus' model be undertaken here. However, it is hoped that the sketch offered here will serve as a template for contextualizing the variety of classroom and non-classroom practices described across the literature.

Applying the Dreyfus Model

Dreyfus illustrates his model with a number of practical examples in various domains of skill acquisition. Driving, piloting an aircraft, chess playing, the complex skill sets that comprise decision-making in business management, and language acquisition are just some of the domains of practice that Dreyfus uses to illustrate the stages of skill acquisition he advances (Dreyfus & Dreyfus, 1980; Dreyfus & Dreyfus, 1988). As we move through the practical implications of Dreyfus' developmental stages, we will draw analogies between the simple example of driving Dreyfus provides and two areas of information seeking behavior that are common topics of instruction in higher education: evaluation and search. As noted in the previous article, it would be a mistake to portray context specific information literate behavior as consisting of a discrete set of skills. From an expert's perspective, evaluation and search, except in unusual or problematic circumstances, are not distinct activities but part of a holistic orientation towards information seeking. But for the purpose of curriculum design, seeing such activities as at first discrete provides a heuristic that allows us to scaffold and sequence learning opportunities that together help foster the holistic ability that, when embodied in practice, we conveniently call "information literate behavior."

Instructing Novices: Starting with Context Free Rules

For Dreyfus, the novice begins learning a skill by being presented with the "context-free features" of the "task environment" that have been taken apart and laid out by an instructor or practitioner of the skill. In the sphere of driving, the context-free features are things like speedometer position or the rpm level displayed on a gauge (Dreyfus, 2002, p. 368). Again, these are what Dreyfus calls "domain-independent" or "non-situational" "features" of the skill environment that have been removed from their context (Dreyfus & Dreyfus, 2005, p. 782). The novice is given a set of rules to follow when she encounters the features to which they correspond. Beginning rules for driving might include "shift to second when the speedometer needle points to 10" (Dreyfus & Dreyfus, 2005, p. 783). Again, Dreyfus notes, students at the novice stage perform in an algorithmic, computer-like way, determining courses of action by cognitively referring to rules or axioms.

Not surprisingly, providing students with the kind of context free rules they need to begin making decisions about information use and information seeking is one of the most common activities in librarians' instructional repertoire, particularly in the area of information evaluation. For example, the checklist approach, despite Meola's (2004) call to chuck it, continues to be an important pedagogical tool, evidenced by the large number of guides for information evaluation still being produced (e.g., Beck (2009); Cohen & Jacobson (2009); Grassian (2008); Ormondroyd (2011)). Dreyfus' model helps us understand the role such checklists play for novices who need rules to guide their actions. Rules prevent novices from becoming overwhelmed by the complicated details of real world information contexts. Within the skill environment in which evaluation is first practiced, simple predefined features such as "currency," "relevance," "authority," etc. (Meriam Library, 2010) can be applied, whether the skill environment is comprised of websites on the Internet, a corpus of books, or a collection of search results within a database. From an expert perspective, terms such as "currency," "relevancy," and "authority" are recognized as inherently problematic, radically context dependent, and bound up with socio-cultural and socio-political norms that render the terms almost useless to practicing experts, as the work of Woolwine (2010) makes clear. But Bailin and Grafstein (2010) point out that although "research operates within a context" and cannot be "decontextualized" and "divorced from the economic and belief systems of the real world" (pp. 97-98), novices do not have the disciplinary background to easily recognize these forces. Rules are thus needed to provide guidance in the absence of domain specific knowledge, either prior to or along with instruction that problematizes these terms and processes. As we will see, an essential part of IL

instructional design is to create just such problems for learners in order to help them move from the novice to the advanced beginner and competent stages of the skill.
There are a variety of pedagogical approaches that give students the opportunity to learn rules within the kinds of controlled environments in which those rules can be consistently applied. Activities that challenge students to evaluate websites and articles according to various rubrics, whether in class or online, can provide them with the experiences needed to develop a facility for acting according to abstract concepts. Learning opportunities that allow students to make decisions about the quality of information they encounter and exercise the rudiments of evaluative skill help them become attuned to the important features of the domain of evaluative practice and begin associating those features with the rules they should follow.

Games have become a growing means for providing active learning opportunities for acquiring and applying evaluative rules (Smale, 2011, 2012). Games are by definition rules-based; as such, they allow information literacy instructional designers to translate the rules novices need to operate within new information seeking task environments into the rules of the game. Games allow students to implement the information literacy rules being taught, for example evaluative rules, within the decomposed task environment the game affords. In Smale's study of an evaluative game, 92% of students surveyed after having played the game reported enjoying it (Smale, 2012, p. 140). Such findings might suggest that the kind of repetition in rule use needed to acquire axioms for action or decision-making in the task environment is made more enjoyable by games, thereby increasing instructional efficiency within the formal learning environment.

The use of polling software (Gewirtz, 2012) and interactive, class response technologies like iClickers (Deleo et al., 2009; Stagg & Lane, 2010) are being increasingly used to give students the chance to put into practice simple algorithmic rules in classroom settings. While not necessarily useful for all instruction (Ross & Furno, 2011), such tools can allow instructors to create multiple opportunities for students to respond to isolated features in a way that can be quickly analyzed and discussed to see if students are in fact acquiring the rules being taught.

But information evaluation is not the only area in which novices are presented with the context free features of an information "landscape." To facilitate student acquisition of early search skills, librarians and disciplinary faculty provide students with curated lists of books, articles, databases, and websites often in print (as on a course syllabus or finding aid) as well as by means of online guides or pathfinders. Curated information eliminates the need to make complex, situation-specific selection decisions when searching for access points to information. One of the most popular tools for creating such domain independent spaces is now the LibGuides product (Gaphery & White, 2012). Such tools expedite the process by which novice students learn the basic rules about where to access information in the disciplines, including, when such information is provided, where to meet and network with skilled practitioners.

Although libraries have traditionally invested a great amount of time and effort in developing first year information literacy programs that rely on in-class, librarian led instruction, Badke (2012, p. 184) has recently argued that the field might want to rethink this approach and increase online instruction for first year students in order to focus more instructional energy on students in later developmental stages. While Dreyfus himself (2009, p. 33) argues against online instruction due to its limitations for allowing opportunities for emotional involvement and embodied risk within the learning environment, he acknowledges that it may serve a useful function in novice instruction in which rules for independently operating in context-free research situations are imparted. SUNY Oswego's "Lake Effect Research Challenge" (Nichols et al. 2013; Nichols 2009, pp. 524-527) can be seen, within context of the Dreyfus skill model, as a comprehensive attempt to orient students to the rules of generic information literacy

processes in an online environment. As Nichols (2009, p. 526) points out, the SUNY Oswego tutorial is designed to provide first year students with the basic concepts they need to participate within the information landscape of most academic disciplines. In one part of the tutorial, students' attention is directed toward subject terms in a set of catalog results they independently locate. Within the context of the tutorial, the subject terms are framed as what we are calling a context-free feature. Students then acquire a basic rule for operating within the space of a catalog – something along the lines of, "Look at subject headings to refine/hone your disciplinary vocabulary and subsequent searches" – that can then be applied in this and other contexts in which the subject heading feature occurs (a database, say). Other rules are imparted in other parts of the tutorial. While students read through articles that provide an overview of a topic, the tutorial "point[s] out the names of experts and scholars [cited or mentioned] in the background source," just as it "point[s] out the availability of scholarly sources" while students move through databases and the larger Web to find information on topics suggested by the tutorial (Nichols, 2009, p. 527). Nichols' uses of the phrase "point out" make it clear that the purpose of the tutorial is to provide students with an efficient way to learn about the basic features of the domain in which IL skills are performed as they might be in future disciplinary practice. Of course such rules are effective only for those inexperienced in a particular domain. But this is the point. The tutorial serves to abstract information and search processes from the context of real-world, situated searching in order to create a controlled environment in which the features of information and search tools might be clearly indicated and associated with various practical rules, in this case reading and search techniques.

Instructing Advanced Beginners: Discovering Maxims and Rules of Thumb in Context

As novices acquire more experience in the domain, they begin to be capable of moving from responding by rote to pre-defined, context free features of the domain of practice to acting according to rules, either given to them or derived by themselves, grounded in situational aspects of the domain. Aspects, again, are those parts of a situation that come to light only through repeated experience of the domain of practice in which skills are performed (trial and error) or the presentation of "choice examples" by instructors (Dreyfus, 2002, p. 369). They are perceived characteristics of situations that reveal themselves to be important in some way to the practice of the skill. The example Dreyfus gives of an aspect in driving is the situational engine sound that indicates that it's time to shift gears.

While the beginner is limited to following rules such as shift when the speedometer hits 10, the advanced beginner is able to sense that there is a situational aspect connected with shifting as well. Rather than continue to follow an a priori rule, she develops or is given a different kind of rule, an "instructional maxim," to inform her behavior during skill practice. In the case of driving, she "learns the maxim: Shift up when the motor sounds like it's racing and down when it sounds like it's straining" (Dreyfus, 2002, p. 369). Clearly, rules covering this sort of situated practice cannot be given to the learner of a skill outside the context of practice. But they can be made clear through independent practice and through examples given by a teacher along with the instructional maxims that correspond to them.

Librarians and disciplinary faculty can and do point out salient aspects of real information landscapes in instructional and, in the case of librarians, reference contexts as well. For example, in an automotive school, an instructor seeking to teach information skills of an evaluative or diagnostic nature related to the repair of engine belt squeal might introduce students to the "spray-bottle test" to teach students about the sounds that serve as situational information about the location and kind of belt squeal they have encountered (Gates Auto Aftermarket, 2011). Within the practical automotive repair context, the instructor is able to point out various sounds when they occur or fail to occur and then give students a rule of thumb for making sense of or evaluating the auditory information they've gathered (e.g., "If you spray the belt at the pulley and the squeal gets worse, the belt lacks tension; if you spray the belt at the pulley and the squeal goes away then comes back, the pulley/component is misaligned.").

Instructors can also facilitate the acquisition of maxims through what we might call the controlled trial and error processes characteristic of instructor-guided, active learning. In "jigsaw" (Wang, 2007) style exercises, such as those described by Fister (1990), Wang (2007), and Stagg and Lane (2010), students are often divided into teams to independently explore a complex information environment and identify aspects of that environment and the information that composes it that may be important to consider when planning to take action or use the information in some way. Through such exploration, students develop rules of thumb for acting in the task environment. They are often then brought back together as a group to instruct each other about their processes, with the instructor serving as a facilitator or guide, who raises issues or points out avenues or courses of action – other or better rules of thumb – not discovered by the students. For example, Stagg and Lane (2010, p. 205) detail an assignment they use to put students in the position of identifying important aspects of an information landscape, in their case Wikipedia, in order to have students construct not an evaluative checklist, but situationally specific traits that when perceived can be "judged," that is to say consciously thought about in terms of a maxim or rule of thumb. By allowing students to independently explore and reflect on information in its situated environment, such activities create opportunities for students to encounter situations that cannot be isolated and explained outside of those situations. Moreover, they demand engaged activity on the part of learners through which they discover for themselves new "rules of thumb" for acting within the situated practice of research. In other words, maxims for acting within the situated context of practice are acquired through a constructive learning process (Talja, et al., 2005, pp. 83-85).

Exercises such as those involving information evaluation described by Meola (2004) can also play an important role in student skill development within this second stage. As he notes, librarians have the opportunity to guide students to different kinds of information sources in order to point out or allow them to discover for themselves differences in the quality of those sources. His suggestions for librarians to "[promote] and [explain] reviewed resources," to guide and help students compare different kinds of sources within the context of their searches, and to design exercises that get students to corroborate the information they find using multiple sources (pp. 338-342) are each useful ways of facilitating the discovery of situationally relevant maxims. Such pedagogical techniques need not be seen as opposed or preferable to rules-based instruction, as Meola argues, but should rather be seen as part of a process by which students learn to move beyond context-free rules and construct, for themselves, context-dependent rules. Acting according to such rules still lacks the situational responsiveness and flexibility characteristic of expert behavior, but self-acquired rules of thumb allow students to enter the "real world" domain of the skill and thereby begin to immerse themselves in situations from which they will continue to derive and ultimately move beyond the need for new formal maxims.

To continue with our consideration of search technique development, students might begin to pick up rules of thumb about where to look within databases or in catalogs for controlled vocabulary, author supplied keywords, and other uses of language that can be seen only within the context of an actual search. It is here that "fully situational" forms of instruction become useful. The "radical student-focused approach" advocated for by Markless and Streatfield (2007), which they call "a framework to support student choice in learning rather than information skills teaching" (Markless & Streatfield 2010, p. 149), can be understood as one means for facilitating the independent acquisition of maxims and rules of thumb.

IL Instruction for Competent Performers: Encouraging Engagement and Emotional Involvement

As we noted earlier, Dreyfus' skill acquisition model paints a picture of how students' perspective taking, decision-making, and emotional involvement change in quality as they progress towards expertise. Up until this point, Dreyfus' model suggests that skill instruction take place in relatively controlled

environments under the guidance of instructors. If students are to progress, however, they must be introduced to the full complexity of situated skill performance in order to move from dependence on abstract principles towards more situated responsiveness. Dreyfus repeatedly notes that the transition from detached, non-involved, analytic behavior to contextually situated, involved, intuitive practice – the "switch," as we called in the first part of this article – depends on the emotional involvement and investment of the learner in the consequences of her actions developed during the late phases of the competent and early phases of the proficient stages. This third stage in Dreyfus' developmental model therefore marks the point in the student's development when mechanical rule following should productively begin to reveal its limitations, for it is in this phase of development that students begin to choose their own perspectives on situations and act according to the rules and maxims they've acquired as best they can. Given their growing independence, it is likely that students will both achieve success and make mistakes. As a correlate, the teacher will begin to take on the role of a coach.

In the sphere of driving, the driver must soon move beyond abstract rule following, which in practice can lead to mechanical performance and, in this domain, potentially dangerous accidents. Following Dreyfus' example, the competent driver going dangerously fast down an off-ramp doesn't yet have the perceptual background to feel that she is in a dangerous situation, nor is there a generic rule she can follow to tell her what to do once she determines the nature of her situation. As he notes, the competent driver has to "spen[d] ...time considering the speed, angle of bank, and felt gravitational forces" – that is to say determine the salient aspects of a situation – and also "decide whether the car's speed is excessive" (Dreyfus, 2002, p. 371). In other words, the driver must make two decisions in this phase versus the single decision within the controlled learning environment proper to the advanced beginner phase. After deliberating about the circumstances in which the action is to be performed, and the action itself, the driver makes a choice about whether or how much to brake or let off of the gas and "is relieved if they get through the curve without being honked at, and shaken if they begin to go into a skid" (Dreyfus, 2004, p. 267). In the process of experiencing joy and relief at successfully navigating the ramp, or fear and shakenness if things go awry, learners begin to associate the variety of perceived sensations of leaving an off ramp with the joy or disconcertedness that results from the outcome of their chosen actions. Restated, they begin to acquire an emotionally charged perceptual repertoire in this stage, a repertoire students need in order to move in later stages of development towards more intuitive forms of action characteristic of expertise.

Dreyfus' model makes it clear that information literacy competence can be developed only within complex contexts that the student cares about and in light of a particular, preferably self-determined intellectual goal. The student has to become involved in the learning situation, and to feel as if something is at risk. The teacher's role in this phase shifts from someone who imparts rules and maxims and offers correction when things go wrong to someone who helps students feel deeply the consequences of their actions and gives students the opportunity to take chances and make new choices when needed. The model precludes learning opportunities that could be successfully accomplished by students in simple, mechanical ways. Teachers must challenge students with assignments and activities that promote risk taking. Moreover, these assignments and activities should elicit instructor feedback – commentary on the successes and mistakes students make – and include opportunities for students to reframe their perspectives and literally revise their take on or approach to a topic or problem.

Students for their part must learn to take and even embrace the risks asked of them by their instructors. They must "stay involved and take to heart [their] failures and glory in [their] successes" (Dreyfus, 2006, p. 47). Assignments can be designed to encourage such risks steering students to produce artifacts (written or otherwise) or undertake activities characteristic of the domain of practice that force them to take a perspective on a topic or situation (whether intellectual or physical), gather "information" to develop that perspective, and put forward independent ideas or make informed moves in the domain of

practice (in various contextually appropriate or inappropriate ways). Having students challenge each other to defend and possibly reframe their perspectives and informed actions – to reorganize their take on an issue or subject and then re-engage in the process of inquiry needed to develop entirely new perspectives — can be a particularly effective exercise to develop the kind of flexibility students will need if they are to continue developing disciplinary expertise.
As such, competence begins to be developed through iterative assignments characteristic of upper-level, undergraduate discipline-specific courses. For example, students at this stage begin to encounter the infinite variety of information sources, many of which cannot be evaluated simply by rote or according to checklists. The student must take a perspective that allows her to decide what kind of information is needed; she must decide if a particular information access point she finds best allows her to achieve a self-directed goal or end in view. She must focus in on those aspects of the information landscape she determines to be relevant regardless of the previous rules she has learned. This is true for both textually and non-textually oriented disciplines. The pedagogical model here put forward is therefore compatible with Badke's recent work (2012), which advocates for "guided, modular assignments" that allow faculty and librarians to engage students in process-oriented learning. Badke argues that individual assignments must be structured to ensure that students can be asked to "revise and/or resubmit" work that demonstrates a lack of progress in the skill (pp. 166-168), giving students the chance to receive further guidance from either librarians or disciplinary faculty.

Dreyfus notes of teachers in general that since students at this stage tend to imitate the teacher as a model, teachers "play a crucial role in whether students will withdraw into being disembodied minds," that is to say remain dependent on inflexible rules to determine their actions, or whether they will "become more and more emotionally involved in the learning situation" thereby developing flexible forms of responsive coping (Dreyfus & Dreyfus, 2005, p. 785). As he notes, "If the teacher is detached and computer-like, the students will be too. Conversely, if the teacher shows involvement in the way he or she pursues the truth, considers daring hypotheses and interpretations, is open to students' suggestions and objections, and is ready to be shown wrong, the students will be more likely to let their own successes and failures matter to them, and rerun the choices that lead to successful or unsuccessful outcomes" (Dreyfus & Dreyfus, 2005, p. 785).

Librarians are in a unique position to help facilitate student risk-taking in their role as "discourse mediators" (Simmons, 2005) at the reference desk by modeling the joys characteristic of successfully finding good information and emphasizing the frustrations and disappointments when one doesn't find good information or mistakes bad information (less good information) for good information (better information). In reference work, we are typically in the same position as the student: non-experts looking to find good information to learn from and base our actions on. We adopt the student's goal or end in view and then make conscious decisions based on the situational/domain elements we have decided should be seen as important. We model the acquisition of new discipline specific vocabulary and how to use that vocabulary independently, sometimes accurately and sometime inaccurately, engaging students in their "zone of proximal development" to help them independently strengthen their growing abilities (Elmborg, 2002, p. 462).

It's also important for both librarians and disciplinary faculty to give students at this stage both positive and negative feedback to nurture emotional involvement. As Gross (2005, p. 156) notes, "Negative feedback is rare in everyday life…. [While] it is easy for people to take credit for their success, failure can often be attributed to multiple causes outside the self. The individual who fails in an endeavor may not understand why the failure occurred. Even when the reason is lack of skill, there are normally other variables to consider to which the individual may prefer to attribute the failure." Those who stall in skill development typically try to fall back on rule following as a method for coping with increasingly complex situations rather than recognize that there aren't rules that govern every real world situation. Very often,

they blame instructors or the complexity of the domain itself for their inability to acquire set rules for every circumstance – an impossible goal. The model here put forward makes it clear that librarians must encourage students to take risks and, when necessary, fail. By encouraging students to take responsibility for that failure, we help them begin to feel deeply the emotions that accompany it. Instructors at this stage take on a role much like that of a coach, helping students learn from mistakes and revel in success in order that they might internalize these emotions and thereby acquire a more robust perceptual repertoire that can be brought to bear in perspective taking and decision making in new situations going forward.

Problem based learning (PBL) pedagogies, methods that "emphasize [the] application, synthesis, and using [of] information in a specific problem context" (Diekema et al., 2011, p. 262), can be seen as useful strategies for creating situations that force students to take risks in formal learning environments. Succinctly described by Wang (2007), Eldredge's (2004) work at the University of New Mexico is a paradigmatic application of problem based IL learning within a medical education context. To establish an information-based problem, medical students are given details of a patient's medical history and current symptoms without having received prior instruction on the health issue. Students must then work together to pool their collective background and research knowledge to search for information that can help them determine how to "save" the hypothetical patient. Such an exercise puts future practitioners in a controlled situation that models the information landscape of the professional world while allowing the librarian to function as a "tutor," rather than simply an instructor (Wang, 2007, p. 155). By such assistance students are led to a new, situated way of being in the world more characteristic of the expert physician than the novice student.

In terms of evaluation, students within such problem based learning contexts do not judge the "quality" of information according to a generic set of criteria from outside the context of the scenario or the situation on which the problem is centered. Rather, the "quality" of information is judged based on the consequences of the "informed" actions of those trying to solve the problem: in a medical context, whether the actions taken by the students allow the patient to improve or languish, live, or die. Evaluation in this context is inherently risky, though limited to a theoretical or hypothetical risk by the formal learning environment. And it is through this risk that the learner begins to nascently embody the information behaviors characteristic of the situationally immersed expert.

With respect to search, students must also be encouraged to take risks at this stage to promote involvement. Competent student researchers, in domains in which information is primarily encountered in texts, can be understood as students who have not yet become immersed in the vocabulary of their disciplines and who lack a clear sense of the paradigms competing at the "research front" (Hjørland, 2011) of their fields. Students should thus be empowered to try out different keywords, different databases, different search engines such as Google and Google Scholar, and be allowed to make mistakes in determining where to go to look for information. In fields where information is located "in" people, students must be encouraged to get to know the variety of disciplinary participants and determine, through instructor designed and guided trial and error, who will and won't be helpful sources. In fields where information is primarily gleaned from things, students must acquaint themselves, in increasingly risk-filled situations, with important physical aspects of the domain of practice and act with respect to them in ways that may or may not turn out right. By letting students go too fast down the off-ramp – by giving students the latitude to locate information in places that may turn out to be wrong or use information in non-optimal ways – instructors give students the opportunity to make moves and arrive at understandings that provide the grounds for perspective taking and decision making in future circumstances. Students thereby begin to acquire a "feel" for where to go and what to look for to perform "informed" actions both within academic and non-academic contexts.

Critical information literacy pedagogies, which in this context can be seen as forms of problem based learning, might also be used by instructors to promote emotional involvement. To be sure, various aspects of critical information literacy pedagogy should find a place at all stages along the continuum of the Dreyfus model. Critical pedagogies can be used to challenge novices to question the ideological grounds that underlie the generic rules or privileged, curated sources we might start them out with. Critical pedagogies can also help advanced beginners acquire a "critical consciousness" (Elmborg, 2006, p. 193) of what the library is and can be, and of themselves as "people capable of agency and meaning making in their own right" (Elmborg, 2006, p. 194). Such pedagogical engagement poses problems to students that can help them see for themselves the risks of remaining dependent on rules or their instructors, thus providing students with the incentive to move beyond algorithmic thinking by embracing the risks that come with independent action and growth. At this third stage, instructors might use critical pedagogies to help students become aware of the risks and challenges posed to them as they transition from their non-academic "home discourse[s]" to the "secondary discourses" and "grammars" characteristic of academic disciplines, a transition that Elmborg sees as an opportunity for instructors to educate students into these new discourses while at the same time "problematizing" the process, privileged discourses, and exclusionary nature of the process itself (Elmborg, 2006, pp. 196-198).

IL instruction for Proficient performers: Facilitating "World Immersion"

By virtue of their budding emotional involvement in the worlds of their disciplines, students become positioned to move towards a more situated responsiveness to the aspects of the domain of practice they encounter, a responsiveness that allows them to take their own perspective within the domain of practice in less deliberate and more intuitive ways.

Drivers who reach proficiency begin to have a visceral sense of the road and their relationship to it. As Dreyfus notes, "The proficient driver, approaching a curve on a rainy day, may feel in the seat of his pants that he is going dangerously fast" (Dreyfus & Dreyfus, 2005, p. 787). By the phrase "feel in the seat of his pants," Dreyfus means that an emotion or feeling is intuitively evoked in the driver by virtue of having felt similar emotions in like circumstances. But even though his perspective may be intuitive at this point, the driver still does not have the accumulated background experience to intuitively know what to do to adjust his driving. In other words, he does not have the perceptual repertoire for an action to be intuitively evoked. The driver must therefore deliberately "decide whether to apply the brakes or merely to reduce pressure by some specific amount on the accelerator." Such lack of intuitive responsiveness may be dangerous for the driver at this stage as "valuable time may be lost while making a decision." But unlike the competent driver "who spends additional time considering the speed, angle of bank, and felt gravitational forces" – the features and aspects of the situation – "in order to decide whether the car's speed is excessive," "the proficient driver" who has an involved sense of the situation and does not need to fall back on rules to perceive the problem "is certainly more likely to negotiate the curve" (Dreyfus & Dreyfus, 2005, p. 787).

Dreyfus translates this analogy to the activity of problem solving in general, noting that "a student at this level [sees] the question that needs to be answered but has to figure out what the answer is." In other words, the student has an intuitive sense that skilled action is called for – she "spontaneously sees the point and the important aspects of the current situation," – but must still deliberate about what the right response to the question – what the right move – should be (Dreyfus & Dreyfus, 2005, p. 787).

Over the course of this article we have theoretically considered and analyzed evaluation and search as separate components of information literacy. It is in these latter phases of skill development that the holistic nature of information literacy as an aspect of embodied disciplinary practice begins to clearly reveal itself and the limitations of such theoretical abstraction. We must therefore begin to describe

evaluation and search as part of a single activity. To do so, we will translate the driving analogy to information literacy instruction by reference to the now traditional notion of the information need. Proficient disciplinary researchers, we might say, are able to arrive at independent insights on issues related to their disciplines – they fearlessly and intuitively arrive at a perspective within a situation – and they may have an increasingly sensitive attitude towards the information landscape of their discipline. They have a clear feeling, from within the situated context of their disciplinary practice, that they need information to solve a problem, take an action, or make the next move in the process of exercising their disciplinary skill. But they may not yet have a sense of all of the options the landscape affords or, in other terms, what information sources are most "credible," "reliable," or "useful" for accomplishing their end in view in the senses that these terms are meaningful within the context of their discipline.

In other words, the student with information literacy proficiency proper to a domain of practice has a feel, at this stage, for when information is needed, but not necessarily what information is needed. She must still fall back on maxims and other rules and think about where to go and what to do to satisfy her need. In Dreyfus' terms, the learner has at this point a perceptual grasp of her goals but still must form a conceptual plan of action for achieving them (Dreyfus & Dreyfus, 2005, pp. 786-787).

Taking an academic discipline as our example, a student may, in the course of her disciplinary practice, read an article that evokes a negative reaction or disagreement, or one that calls forth a question in her mind. Where an expert would have an intuitive sense of where to go to illuminate her question about the text – look for what X colleague in the field has said about it in the Journal of Y, walk across the hall to talk to a trusted colleague in order to develop, through conversation, a thought about the topic for himself – the proficient scholar is still not fully immersed in the world of her discipline such that she immediately perceives what move to make to resolve her need. She must deliberate about where to go and what to do to shed light on her situation. Moreover, even after deliberating about where to go and what to do, she must deliberate about the usefulness of whatever information she finds and then think about whether it's optimal. If she is operating in a text-centric domain, she may need to look up information about an author, seek out other publications he or she may have written, determine whether the author has established a body of work, and determine the author's place within the field. If she is operating in field in which knowledge is located in people – performing an internship during or following culinary school, for example – she may need to use her socio-culturally developed senses of taste and vision to deliberately judge the work of those chefs in her surroundings who might be able to offer a way forward towards a solution to her own cooking problem (for a preliminary exploration of information use by apprentice chefs, see Fafeita & Lloyd, 2012). Each of these actions allows her to deliberately determine what information to seek and whether, once found, it can help her achieve her goal. Over time, by repeating this process, each of these interactions with the "information landscape" and their emotional adjuncts becomes part of the perceptual background against which the student will come to see new situations and, eventually, intuitively perceive rather than deliberately decide what needs to be done in them.

Learning opportunities in this phase are best thought of as means by which students acquire the more extensive and more nuanced perceptual repertoire needed to perform at the expert level. Over the course of acquiring this perceptual repertoire, the student's world begins to exhibit characteristics that prompt emotional dispositions and solicit proper actions. But until her world becomes more intuitively meaningful by virtue of its having been imbued with emotion over the course of these last two stages of development, she must still reason about where to go to locate the information she feels she needs and about whether a given information source meets the threshold for optimally allowing her to achieve her end in view.

Learning opportunities designed to facilitate disciplinary participation to help students develop IL proficiency may include exercises that challenge students to locate and identify the various paradigms

competing within a domain of practice. Such exercises can be particularly effective at getting students to become more aware of the situational perspectives and the contexts of information production underlying or at work within the research findings they encounter. As students become more proficient in their disciplines, as they transition from acting as a member of a community of practice to being a member (Lloyd, 2005), the complexities of the social and political systems that comprise their fields make the process of seeking, evaluating, and using information – perceiving the meaning of information within the context of the discipline or domain – that much more difficult. As Hjørland (2011) notes with respect to traditional academic research disciplines, information, from wherever it may be found, "need[s] to be evaluated against knowledge at the research front" of the field in relation to the unfolding "controversies and different points of view" that typically compete for explanatory legitimacy within disciplines (p. 1893). While Hjørland is discussing the use and evaluation of general information sources, we can extend his idea to the budding disciplinary or domain expert. What becomes of central importance in this stage of IL development is the feel for the role of disciplinary paradigms and other highly contextual aspects of the information landscape that shape the significance of information encountered. Extending Hjørland's insight into the non-text based discipline of cooking, we might say that the competent chef must be made aware of the variety of contexts (cuisines, kitchens, cultures) that shape the way food is qualitatively perceived if he or she is to progress towards proficiency.

Instructors might have students create "case studies" along the lines of those put forward by Bailin and Grafstein (2010) to illustrate, for example, the ways in which different journals in a particular field are often established to give voice to those working from within competing disciplinary paradigms or to discover how economic forces can influence or corrupt scholarship. By engaging students in critical analysis of their fields through research activities into the research and publication processes within them, students can acquire new contextual perspectives. As a result, students can become more aware "that there may exist conflicts, competing interests and historical battles for the control of discourses and power within and between professional groups as much as shared practice and history" (Talja et al., 2005, p. 88). While such points can be taught to students as concepts in earlier phases of their disciplinary development, it is only within this latter phase that the student has the background to perceive these competing paradigms and engage in the critical conversation between them.

Students at this stage can also be made most aware of their power to transform and influence discourse communities and the ways discourse communities exercise power and control the development of further discourse. While critical approaches to instruction seek to give students a sense of agency at all levels of their development, it's within the context of their budding "disciplinarity" that students begin to transition from simply being students of the discipline to participants within the discipline, or what we might characterize "through" the discipline rather than simply thinking "about" it.

The disciplinary or domain expert at this stage often provides the proficient student more insight than librarians or information professionals can into the living world of journals, articles, authors, and theories. In more general terms, we can say that at this stage the relevant parts of the information landscape find their place and meaning within the worlds in which information is gathered, evaluated, and generally made sense of by communities of practice. The student is truly entering the conversations that comprise her community and is here beginning to see, that is to say, literally perceive, her world in a professional way. As we know from our own graduate work or our continuing development of skill within a particular domain, it is important for students to work with a variety of experts to start to see their world in different ways.

Development at this stage therefore requires that students have contact with the real world of practice. Instructors must provide assignments and experiences embedded within the sites of actual information practice students will be entering following their formal education, sites that we can call the "workplace."

Instructors must therefore design practical, embodied learning opportunities outside the classroom. By operating within the workplace as part of their formal learning, students develop and exercise situational information literacy skills in contexts that serve to expand their perceptual repertoire and thereby move them towards expertise.

For students seeking to enter academia as a profession, the academy is itself the workplace. In the academic landscape, fostering close connections with expert disciplinary faculty, attending academic conferences, and apprenticing as research assistants are all ways students acquire disciplinary expertise. The processes of completing advanced seminar paper writing, capstone assignments, senior projects, and master's or PhD level thesis writing are practical and embodied activities that initiate students into the information literacy practices of experts in the field. We might call such advanced assignments "organic" in so far as they arise out of students' lived experience of their field and require students to arrive at a problem within a text or disciplinary context. More advanced students can be given the opportunity to attend conferences, present papers, or impart new knowledge they're developing in whatever venues professionals in their disciplines share such information.

For students moving into various non-academic landscapes, different kinds of experiences need to be designed. Information literacy experiences can be incorporated into internships and various practica in order to give students more concrete and situationally determined opportunities to develop those information practices proper to the specific contexts of the workplace landscapes. Such learning opportunities are often already present in curricula, particularly at the graduate level, and are often taught collaboratively by librarians and faculty in the disciplines. Law, medicine, journalism, and other information rich, non-academic disciplines that require students to engage with information in the ways they will be expected to on the job can be taken as examples. Such programs often have a "clinical" component or course by which students are situated in a real workplace in order to put into practice the skills they have learned in the classroom. For example, Grose (2013) describes a clinical course in law she teaches on the topic of estate planning. As an instructor in the clinical setting, her role is to provide "supervision" and give students "opportunity for reflection" on the complexities they face as they become involved in the lives of real clients, thus creating "a deeper and richer educational experience" (Grose, 2013, p. 511). Faculty who embrace clinical pedagogy provide students with an opportunity to "assum[e] a role, lear[n] the obligations of the role, recognize[e] certain cues involved in assuming that role, and ultimately acquir[e] the aptitudes to perform the role" (p. 499). As with any real life professional practice, gathering information forms a central part of clinical situation. As Grose notes, her syllabus contains such objectives as "gather information and goals from your client," and "conduct research in case law, statutes and relevant secondary authority" (pp. 502-503), activities which can be taught in the abstract as processes consisting of rules, but whose complexities and nuances become much more apparent within the situated context of the lawyer/client relationship.

When it comes to higher education experiences that provide real-world, situated information literacy learning opportunities, such "clinical" experiences seem the exception rather than the rule. In recent years, however, a growing number of researchers and scholars in the library and information sciences fields have started to fill this gap by putting forward various approaches towards developing information rich internship programs (Holler 2008; Hoyer 2011) and service learning experiences outside the classroom both at the undergraduate (Riddle 2010) and graduate (Roy et al. 2009) levels, learning experiences that provide students with the opportunity to practice information literate behaviors within non-academic situated contexts.

In each of the above suggestions, the learning opportunity is again meant to immerse students in the world of practice in order to allow them to develop a more extensive perceptual repertoire within the information environment/landscape of their discipline. By embracing clinical pedagogy and other forms

of practical, real-world instruction, faculty in the disciplines, as well as librarians, can involve students in the formal and informal networks through which experts within the domain of practice communicate about issues and ideas. Such immersion can be an important way of acculturating or socializing students into the modes of intuitive judgment and action characteristic of expert practice within the discipline. Only by being around and working with experts in the field will students progress towards expertise.

Getting to Expertise

As we described in the first paper in this series, Dreyfus sees expertise as a form of perceptual, rather than conceptual, responsiveness to situations that call for action within a domain of practice. By virtue of extensive experience in the domain, the expert comes to embody a "vast repertoire of situational discriminations" that allows her both to see and respond intuitively to the majority of circumstances that call for skilled action (Dreyfus, 2002, p. 371).

Dreyfus notes that "the expert driver, generally without any awareness, not only feels when slowing down on an off-ramp is required, he or she knows how to perform the appropriate action without calculating and comparing alternatives. What must be done, simply is done" (Dreyfus, 2002, p. 372). For those of us who have acquired this rather common form of expertise, we know that it comes only through extensive driving experience. Learning opportunities for developing expertise can't be created in formal learning environments or facilitated by instructors in practice.

Similarly, the development of expert information practices is only acquired "on the job." As information professionals, we might reflect on how we've acquired the expert reference skills that allow us (at least at times) to have an intuitive sense of where to go when a patron poses a question (Sweeney, 2008). Having been asked thousands of questions and consulted hundreds of sources over many years of professional work, the expert reference librarian, like any other expert, "has learned to distinguish those situations requiring one action from those demanding another," thus allowing for "the immediate intuitive situational response that is characteristic of expertise" (Dreyfus, 2002, p. 372). Expert performance at this stage is phenomenologically similar across all domains in so far as all expert practice shares this intuitive character. Meola's (2004) casual remark that "good cooking, like good research is more than simply following a recipe" captures a profound truth about the nature of skilled action. The scholar's intuitions about where to go to seek inspiration as she develops new knowledge is almost identical to the work of the experienced chef who tastes his dish and immediately makes a move for one ingredient or another rather than fall back on a recipe (Fafeita and Lloyd, 2012, pp. 94-95). No rules can guide such expert performance (though, again, experts can and do revert to rules and maxims to guide their actions when they find themselves facing problems or in unusual circumstances). Our role as educators is to prepare our students to fearlessly enter their worlds of work with the desire to take the risks necessary to acquire the vast repertoire of experiences upon which expert practice depends.

Conclusion

Because the Dreyfus model is not a model of information seeking behavior or information practice, but rather a model of skill acquisition as such, it is inclusive of the many explanatory frameworks and pedagogies which have been put forward by the IL field. It allows instructors to draw from them and find the most practical and useful place for them within formal instructional contexts. This essay again offers only a sketch of how the variety of pedagogical approaches available in the literature might be adapted to the framework afforded by Dreyfus. To conclude, we can briefly outline some of the advantages the Dreyfus model affords to both students and educators (both librarians and disciplinary faculty) in the area of IL skill acquisition.

Students who are made aware of this model and for whom curriculum is explicitly structured in terms of it can make use of it as a metacognitive model for their own process of becoming a member of an information literate community of practice, whatever that community may be. Students who can articulate for themselves the process of their skill acquisition in terms of this model can recognize for themselves when they are shying away from engaged, emotional involvement in situations that call for it, when they must take risks, and when they must turn to the embodied world of situated practice in order to further their own information literacy development. For students who see their education as a process of becoming acculturated to a discipline, information literacy is not something extraneous or additional to the content and practices of their discipline, but rather a window through which to look at their own skilled performance.

The Dreyfus model as well offers several important metacognitive benefits to educators. First, the Dreyfus model provides librarians and disciplinary instructors with both a "predictive and prescriptive power" (Nichols, 2009, p. 523), enabling us to recognize where students may be in the process of IL skill development, whether we encounter them at the reference desk, in the library, or in the disciplinary classroom, and what forms of instruction will best further their development. By identifying a particular student or group of students as being earlier or further along the skill continuum Dreyfus provides, we can thereby maximize formal instructional impact and provide students with suggestions on how they might progress along that continuum towards expertise.

Second, the Drefyus model serves to foster the kind of reflective teaching practice argued for by Jacobs (2008) and Booth (2011). As a matrix or rubric, it allows us to analyze and reflect on the kinds of pedagogical approaches we may be taking or want to take – behaviorist-style exercises for rule acquisition, constructivist or constructionist approaches, etc. – and consider which may be the most effective for a given student or group of students based on where they are in their skill development. For example, taking Ross and Furno's 2011 study comparing the effects on student learning of traditional instruction, iClickers, and problem based learning in a lower-level English composition course, we might use the stages of Dreyfus's skill model to interpret what at first seems to simply be conflicting or unclear data (p. 295). In their article they find that traditional, lecture-type instructional methods in several respects allowed for more gains in student learning as they measured it than problem based learning. From the perspective offered by the Dreyfus skill model, we might interpret their data as supporting the idea that problem based learning may have less benefit in lower level courses in which generic, general education skills are being taught, as compared to traditional instruction or the reinforcement of concepts through the use of clickers. The model might also suggest other uses for clicker- or problem-based learning activities than were designed that could later be tested.

Third, and we will only be able to gesture in this direction, the application of the Dreyfus skill acquisition model to information literacy can help librarians become more aware of and potentially open to a variety of socio-cultural understandings of teaching and learning. For example, we can see the Dreyfus model as compatible with, or at the least complementary to, Brown, Collins, and Daguid's (1989) work on situated cognition and cognitive apprenticeship (Collins, Brown, Newman, 1989), as well as Lave and Wenger's work in the area of situated and practice based learning (Lave & Wenger, 2008; Wenger, 1998). Dreyfus' model can also be seen to complement Schaztki's (2002) work on site ontology and practice theory and Gibson's theory of affordances (1986), important theoretical approaches Lloyd (2007; 2010a; 2006) has introduced to the IL field in several articles (for another application affordance theory, see also Sadler & Given, 2007). In passing, we can suggest that future information literacy researchers consider the work of Rietveld (2008, 2010), whose theory of "situated normativity" draws on the best qualities of the above approaches, as a way to synthesize existing scholarship on situated information literacy in the library and information science fields.

Again, the Dreyfus model has here been put forward as a model for designing student learning opportunities in formal higher education learning environments that take full advantage of the efficiencies afforded by structured learning settings. It has been offered as method for formally structuring learning opportunities that allow students to become socialized into the kinds of "academic tribes and territories" Kautto and Talja (2007) and other like-minded authors have pointed to as the socio-cultural contexts within which information practices find their meaning and take their shape. As a synthetic model, it has the advantage of finding a place for the variety of other approaches to information literacy instruction that have been put forward by the field. But again, instructors should not be overly rigid in applying it in practice. As noted in the conclusion to the previous article, learners do not acquire skills in a fixed, linear manner. Nor do all aspects of a skill develop concurrently. This model therefore finds itself most at home in higher education curricular approaches that seek to embed and integrate iterative, recursive, and scaffolded information literacy learning opportunities throughout disciplinary curricula.

In conclusion, we should note that while the Dreyfus model of skill acquisition offers instructors a clear method for designing learning opportunities and students a clear path towards developing skill, it provides no guidance for either as to why or whether they should do so. This question of value can only be answered by reflecting on the relation between education that seeks to socialize students into socio-cultural forms of life and education that aims to develop the ability to critically question such socialization: in other words, the relation between professional or vocational and liberal education (for guidance on this topic, see Wegener (1978) and Nussbaum (2010)).

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